



Climate Program Office Review

May 24-26, 2022

Pre-Recorded Presentation Supporting
Activity Area 1: Climate Science / Earth
System Science and Modeling

Climate Variability and Predictability (CVP) Program

Sandy Lucas

Federal Program Manager

Jose Algarin

Program Specialist, UCAR

CVP 101



CVP is a global research program, with regional focus areas where predictability of climate signals is highest. Its goal is the process-level understanding of the coupled ocean- land-atmosphere- ice-systems. CVP uses:

- Process studies, modeling and field campaigns
- Historical: had land-focus area and Arctic-focus but it was lost during budget contractions,

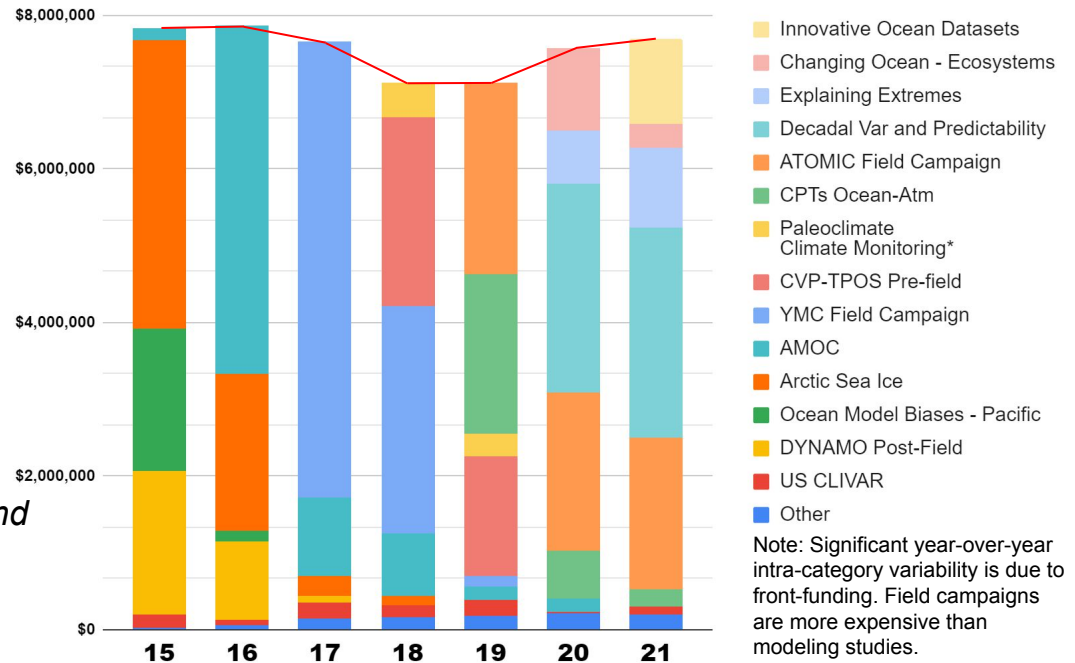
Program Manager: Sandy Lucas, PhD

Program Specialist: Jose Algarin

- ✓ *Specific Mandates: Global Change Research Act, Weather Act (2017)*
- ✓ *Historical considerations: Strong linkages to US CLIVAR and WCRP topics; Interagency and International collaboration, leverage funding*
- ✓ *Still has strong international collaborations*

Program components:

- \$7.7M FY21 Budget
- Competitive Research (99+%); mostly 3-yr projects



Note: Significant year-over-year intra-category variability is due to front-funding. Field campaigns are more expensive than modeling studies.

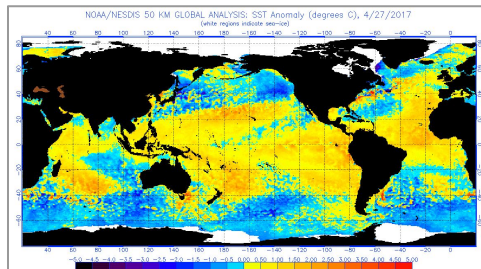
CVP 101, cont.



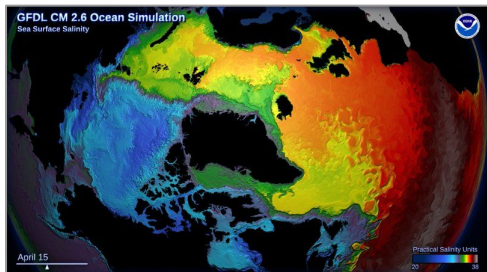
FY17-21 Research Portfolio



Air-Sea Interaction and Convection - Field Campaigns (FY17, FY18, FY19)



Bridging Observations and Modeling (FY19, FY20, FY21)

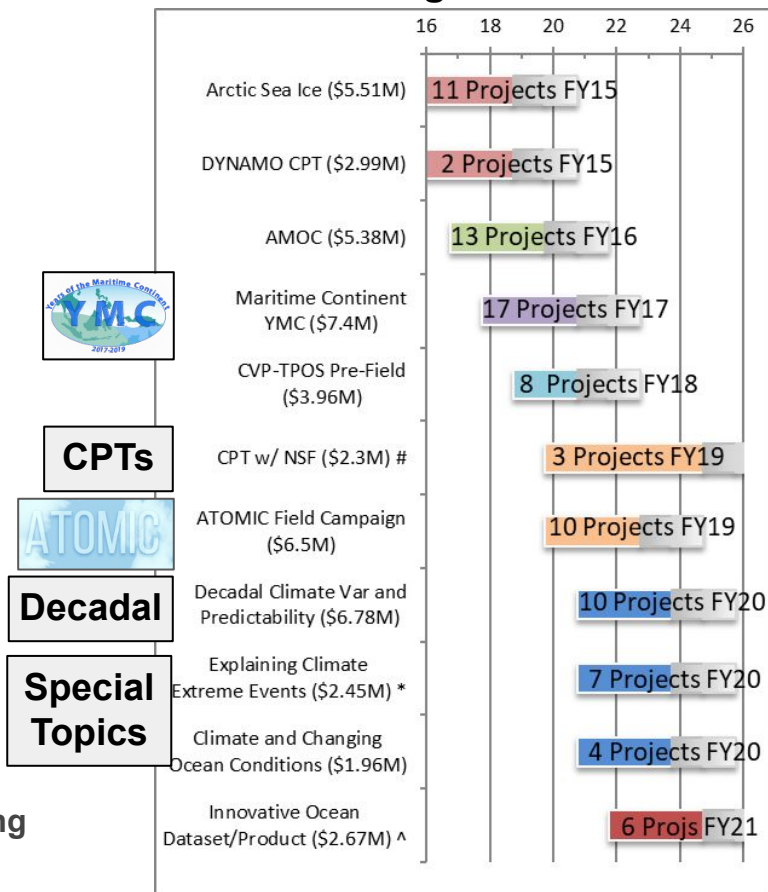


Decadal Variability and Predictability (FY20)



Special Topics: Changing Ocean-Fisheries (FY20); Explaining Extreme Events (FY20)

Active Awards during Review Period



CPTs

ATOMIC

Decadal

Special Topics

Key Accomplishments (FY17-21)



Quality

Most Cited Publication, By Year

Ding, Qinghua, et al. (2017) "Influence of high-latitude atmospheric circulation changes on summertime Arctic sea ice" *Nature Climate Change* 173

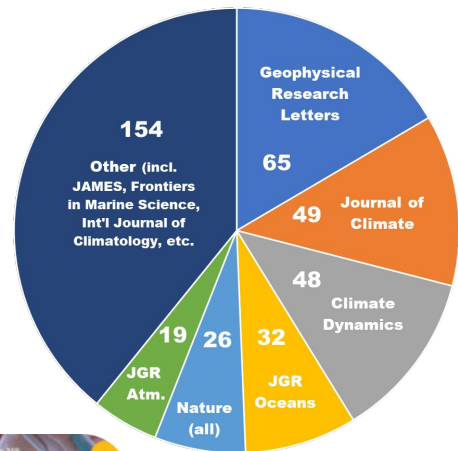
87 Zhao, Ming, et al. (2018) "The GFDL global atmosphere and land model AM4. 0/LM4. 0: 2. Model description, sensitivity studies, and tuning strategies." *Journal of Advances in Modeling Earth Systems*

Dai, Aiguo, et al. (2019) "Arctic amplification is caused by sea-ice loss under increasing CO2." *Nature Communications* 144

38 Smith, Doug M., et al. (2020) "North Atlantic climate far more predictable than models imply." *Nature*

Stephan, Claudia Christine, et al. (2021) "Ship-and island-based atmospheric soundings from the 2020 EUREC4A field campaign." *Earth System Science Data* 6

Total Publications, by Journal (394 total)



1 paper: 32 news stories



North India is getting lesser rain be warmer
Business Insider India, 27 Nov 2019



Rapid heating of Indian Ocean worsens
The Guardian, 27 May 2021

Key Accomplishments (FY17-21)



Relevance

Strategic Partnerships

NOAA

- **OAR Labs:** PMEL, AOML, PSL, CSL, GFDL
- **OAR Programs:** GOMO, UAS, WPO
- **NWS:** CPC, EMC, OSTI-Modeling Division

Academia: Universities in 20+ states, plus international

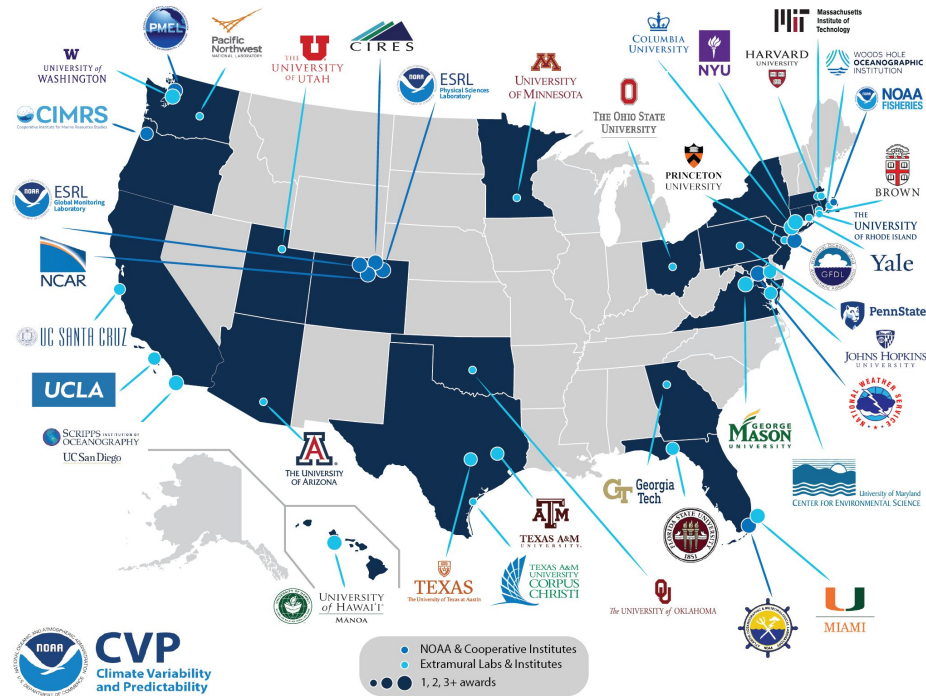
Private sector: NOFO, NOAA-agreements

Federal agencies: NSF, ONR, NASA, DOE

Community-Driven: US CLIVAR, USGCRP, WCRP, Int'l CLIVAR

Actively engaged with various NOAA/CPO priorities:
Precipitation Prediction Grand Challenge, Climate and Fisheries Initiative, Coastal Inundation Initiative, Explaining Extremes Attribution, ENSO+Impacts in Changing Climate

CVP- Funded Labs and Institutes (FY2017-2021)



Key Accomplishments (FY17-21)



Performance

In the past 5 years,

- **2** Field Campaigns Completed: (YMC, ATOMIC)
 - **Preparing for #3**: Tropical Pacific field campaign with modeling studies, monthly PI Team meetings. New proposals under review
 - ATOMIC, in Barbados, Tropical Clouds, Air-Sea Interaction
 - Special Collection in Earth System Science Data; Data free at NCEI
- **3** Projects on AMOC as a driver of sea level changes on the US East coast, Coastal Inundation is a CPO Risk Area
- **3** CPTs NCAR/GFDL/Academia hosting annual meetings
- **10+** Workshops
 - Atmospheric Convection and Air-Sea Interactions over the Tropical Oceans; – Tropical Pacific Obs Needs
 - AMOC Metrics: Coordinating Observations and Models
 - Sources and Sinks of Ocean Mesoscale Eddy Energy
 - Funded in collaboration with US CLIVAR agencies
- **2** AGU Town Halls, **4** AGU sessions, **10** YMC Webinars
- **90-120** Publications per year
- **120** Projects: 65 new and 55 projects sunsetted in 5 years

CVP By The Numbers FY17-FY21

- 160 proposals received, 65 projects started and funded
- Success rate: 25%, from LOIs to funded projects
- Of all of the applicants, CVP funded ~31% of total dollars requested



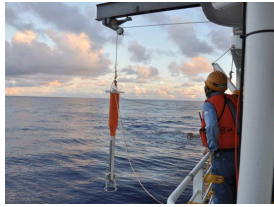
Years of the
Maritime Continent

Key Accomplishments (FY17-21)

Cross Program Efforts

Co-Funding
 * with COM, MAPP
 ^ with COM, GOMO Office
 + with ONR
 # with NSF

FY18 CVP-TPOS Pre-Field



FY20 Explaining Extremes Type 1 & 2*



FY20 Changing Oceans Marine Ecosystems

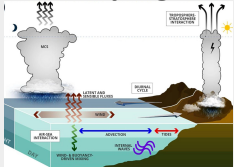


FY21 Innovative Ocean Datasets^

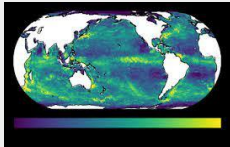


Interagency Efforts

FY17 YMC Field Campaign



FY19 CPTs# Ocean-Atm



FY19 ATOMIC Field Campaign



International Efforts

ATOMIC is the U.S. contribution to EUREC4A

January 6 – February 15, 2020

It is an ocean, atmosphere, and cloud study off the coast of Barbados



ATOMIC Field Campaign
 NOAA Led, Innovative
 Technology - Big Science



Strategic Lookahead



- **Drivers:**

- National and International Research Topics (US CLIVAR, WCRP)
- Development TPOS field campaign
- Emerging NOAA priority PPGC and GPEX. CVP's role in engaging the external community and NOAA internal community
- Ongoing priority of CPO areas: Coastal Risk Area, NOAA Climate and Fisheries Initiative

- **Some Strategic Considerations:**

- CVP has moved to more applied research themes (Climate-Fish, Coastal Inundation) rather than foundational research (process understanding, predictability).
 - Is applied research the best investment? The right balance?
- Should CVP continue to expand research themes that are driven by Labs, WPO, NWS/CPC, NMFS or others? Or, refocus on the external community's research directions?
- Should CVP keep a role in Arctic research given other Programs in OAR?
- CVP Field Observation dataset/product development is relevant to many NOAA and CPO priorities.
 - Is CVP providing the most benefit, largest impact?

FY22 Competitions:

1. Joint Competition to Advance Process Understanding and Representation of Precipitation in Models (CVP/NWS-OSTI)
2. Observation and Modeling Studies in Support of Tropical Pacific Process Studies, Pre-Field-II (CVP)

Global Precipitation Experiment (GPEX)

GPEX will systematically and comprehensively **reduce model biases** in global coupled models and **improve precipitation prediction** using an integrated observations and modeling strategy and targeting critical processes and phenomena.

Predictability and Processes studies

Predictability and Processes studies including field experiments and hierarchical model experiments



Optimizing observations and datasets

Optimize observations and datasets for prediction initialization, evaluation and process understanding.



Improving coupled prediction models

Improving coupled prediction models by improved physics, high-resolution modeling, ML/AL, coupled data assimilation

User engagement

User engagement throughout the entire process as an input to guide future research needs and requirements for improvements

Backup Information



CVP Website

<https://www.cpo.noaa.gov/cvp>

CVP Funded Projects

<https://www.cpo.noaa.gov/Meet-the-Divisions/Earth-System-Science-and-Modeling/CVP/Funded-Projects>

CVP PI Webinar Series

<https://www.cpo.noaa.gov/Meet-the-Divisions/Earth-System-Science-and-Modeling/CVP/Webinars#741281-webinars>

CBS News Feature - ATOMIC -

<https://www.cbsnews.com/video/study-aims-to-examine-links-between-climate-change-and-clouds/>

